UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I
5 POST OFFICE SQUARE – SUITE 100
BOSTON, MASSACHUSETTS 02109-3012

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

April 5, 2011

Michael Gwyther, Station Superintendent
First Light Power Resources
Mount Tom Station
200 North Hampton Street
Holyoke, MA 01040

Re: Modifications to Information Request Dated February 15, 2011, for NPDES Permit Reissuance, NPDES Permit No: MA0005339

Dear Mr. Murray:

The New England Regional Office of the United States Environmental Protection Agency (EPA or Agency) has received FirstLight's Request for Modification Letter is developing a draft National Pollutant Discharge Elimination System (NPDES) Permit (No. MA0005339) for FirstLight Power Resources Services, LLC's (FirstLight or the Company) Mount Tom Electric Generating Station, Holyoke, MA (MTS or Station).

In support of this work, EPA is sending FirstLight this information request letter pursuant to Section 308(a) of the Clean Water Act (CWA), 33 U.S.C. §1318(a). CWA § 308(a) provides, in pertinent part, as follows:

> [w]henever required to carry out the objective of this chapter, including but not limited to (1) developing or assisting in the development of any effluent limitation, or other limitation, prohibition, or effluent standard, pretreatment standard, or standard of performance under this chapter; . . . (3) any requirement established under this section; or (4) carrying out section[ ] . . . 1342 . . . of this title –
>
> (A) the Administrator shall require the owner or operating of any point source to . . . (ii) make such reports, . . . and (v) provide such other information as he may reasonably require . . ..33 U.S.C. § 1318(a). Failure to comply with an EPA information request sent under CWA § 308(a) could subject the recipient of the request to an EPA enforcement action under CWA § 309, 33 U.S.C. § 1319.

FirstLight may assert a business confidentiality claim with respect to part or all of the information submitted to EPA in the manner described at 40 CFR Part 2.203(b). Information covered by such a claim will be disclosed by EPA only to the extent, and by means, of the procedures set forth in 40 CFR Part 2, Subpart B. If no such claim accompanies the information when it is submitted to EPA, it may be made available to the public by EPA without further notice to FirstLight. Please note that effluent information may not be regarded as confidential.

Information Request

I. Thermal Discharge Information Request

a. As part of the MTS NPDES Permit File, EPA retains a copy of a thermal plume study of the MTS discharge from Outfall 001, conducted in June and August of 1974. Please submit to EPA any additional thermal studies in your possession pertaining to the Connecticut River in the general area of MTS, including any thermal discharge modeling or in-stream thermal monitoring conducted by or for MTS.

b. Conduct a thermal plume analysis of Outfall 001 and submit to EPA the detailed impact of the thermal discharge on the Connecticut River under the following projected conditions:

1) a MTS discharge with a delta T of 20°F and a discharge temperature of 102°F during one pump operation (70 million gallons per day (MGD)) as well as two pump operation (133.2 MGD). These operational conditions shall take place during a warm weather summer period (air temperature 95°F) accompanied by low flow conditions in the Connecticut River (approximately 3000 cfs).
2) a MTS discharge with a delta T of 20°F and a discharge temperature of 80°F during one pump operation (70 million gallons per day MGD) as well as two pump operation (133.2 MGD). These operational conditions shall take place during representative spring (April – May) conditions (air temperature 65°F) accompanied by spring flow conditions in the Connecticut River (approximately 15,000 cfs).
3) a MTS discharge with a delta T of 32°F and a discharge temperature of 115°F during one pump operation (70 MGD). These operational conditions shall take place during a warm weather summer period (air temperature 95°F) accompanied by low flow conditions in the Connecticut River (approximately 3000 cfs). See Sections 5.4, Attachment I.
4) a MTS discharge with a delta T of 32°F and a discharge temperature of 115°F during one pump operation (70 MGD). These operational conditions shall take place during representative spring (April – May) conditions (air temperature

65°F) accompanied by spring flow conditions in the Connecticut River (approximately 15,000 cfs). See Section 5.5, Attachment I.

Include an explanation of methods used to conduct this analysis.

c. The information requested in Parts I.b.1) and I.b.2) shall be represented as a series of maps, showing the positions of isotherms at two degree Fahrenheit intervals in the river, represented as 1) the difference in temperature between the temperature affected by the discharge and the ambient river temperature in degrees Fahrenheit (delta T), and 2) the absolute temperature in degrees Fahrenheit. The maps shall display the area of the river from just upstream of the outfall to the downstream point in the river where fully mixed ambient river conditions resume. The distance represented by the maps shall be clearly identified.

    1) One series of maps shall represent an overhead view of the river, showing bank-to-bank or lateral isotherms at the surface, at mid-depth and near the bottom of the river.

    2) Another series of maps shall represent a longitudinal profile, showing temperatures at all depths along the longitudinal line of maximum temperatures, with isotherms.

Include an explanation of methods used to construct these maps. A series of monthly progress reports shall be submitted to EPA, as specified in Part III.b. of this letter. The first progress report shall identify the additional environmental data necessary to select, calibrate and verify a satisfactory model which is capable of generating the data requested in Parts I.b. and I.c. A schedule detailing the timeline to complete Parts I.b and I.c. shall also be included in the first progress report.

d. As part of the CWIS technology evaluation, EPA requests that FirstLight submit an overview of MTS's potential impacts to the aquatic habitat of the Connecticut River under current operating conditions, as well as projected operation using the technologies being evaluated. Particular attention must be paid to impacts to all life stages of shortnose sturgeon (Federally Listed Species), Atlantic salmon (Essential Fish Habitat), and river herring and American shad (anadromous species). Evaluate the expected impacts to aquatic life in the Connecticut River when any construction or benthic disturbance in the river is part of the installation and/or operation of a technology discussed in Attachment I.

II. Impingement and Entrainment Reduction Best Technology Available Information Request

EPA has reviewed the MTS Impingement Report (December 2008), the MTS Cooling Water Intake Structure Information Document (January 2008), and raw entrainment data from MTS from October 2008 through September 2009, submitted on May 11, 2010.

The documents identified above were used to examine the feasibility of technologies necessary to achieve the best technology available (BTA) for minimizing adverse environmental impacts from impingement and entrainment at MTS.

Please provide the following information:

a. Review EPA's Preliminary 316(b) Technology Feasibility Review (Attachment I) and update, supplement and/or correct the information to the extent that it is outdated, incomplete or inaccurate.

b. Provide detailed costs as annual costs and as net present value costs (NPV) for cost estimates listed in the MTS Cooling Water Intake Structure Information Document (January 2008) and identified in Attachment I. It was not clear to EPA whether costs were presented as NPV in the January 2008 document. If a cost is not provided for a technology in this document and it is requested in Attachment I, please submit cost information or an explanation as to why a cost cannot be determined. NPV costs shall be annualized over the expected life of the technology. Assume a discount rate of 7.6% or explain the basis of an alternate discount rate. If a different method is used to represent the cost of the technology, all appropriate technologies evaluated in the January 2008 report and identified in Attachment I must be recalculated using the different method so that the annualized NPV cost estimates for each technology are directly comparable. A justification for the selected cost calculation must also be included.

c. Provide information on the extent to which the MassDEP consent order to cap and clear cut the northern sector of the Mount Tom site may affect the placement of a Mechanical Draft Cooling Tower(s).

d. Provide information regarding the volume of discharge water expected and the specific thermal and chemical characteristics of the discharge each month using a Mechanical Draft Cooling Tower(s) closed cycle cooling system at Mount Tom Station (Section 5.1, Attachment I). Include the dimensions and thermal characteristics of the reduced thermal plume in the Connecticut River each month.

e. Provide a yearly cost estimate, if any, related to maintaining one pump operation in May and June while still meeting delta T and maximum temperature discharge limits now in effect. Also provide a yearly cost estimate assuming one pump operation in May and June with a delta T limit of 32°F and the maximum discharge temperature limit of 115°F Also assess the impact of increased water temperature from the MTS discharge during the warmer months (see Section 5.5, Attachment I).

f. Determine the percentage of excess capacity of the cooling water intake pumps at MTS for each month and assess the potential for reduction in cooling water use and related reduction in impingement and entrainment. Provide a yearly operational cost resulting from the use of variable speed pumps. (Section 5.6, Attachment I).

g. Provide a complete estimate of capital cost and yearly operational and maintenance costs to upgrade the fish return system at MTS, including modifications to the intake structure to accommodate the larger screens (Sections 5.7 and 5.8, Attachment I).

h. Evaluate the expected performance of the Barrier Net at a pore size designed to eliminate or substantially reduce entrainment in the Connecticut River and provide the expected area of the net, location and anchoring needed for barrier nets of this pore sizes. Also include all costs (Section 5.9, Attachment I).

i. Evaluate the reduction in entrainment of Connecticut River ichthyoplankton by using cylindrical wedge wire screen intakes with a mesh size of 3 millimeters. Discuss mortality estimates of ichthyoplankton that become trapped on the wedge wire screen. Evaluate the cylindrical wedge wire screen impingement and entrainment effectiveness with slot sizes of 1.0 mm and 0.5 mm. Determine the size and number of cylinders necessary to be able to use cylindrical screens of these slot sizes and evaluate the feasibility of installing and operating these units as well as the impacts associated with their placement and operation. Also include all costs (Section 5.11, Attachment I).

j. Provide yearly operation and maintenance costs associated with expanding the intake at the river at MTS (Section 5.12, Attachment I).

III. Deliverable Schedule

a. Submit the document(s) requested in Part I.a. of this letter, if any, within 30 days of the receipt of this letter.

b. Submit a monthly progress report during the last week of each calendar month, detailing the progress of the thermal analysis requested in Parts I.b. and I.c. of this letter.

c. Submit all information requested in Parts I.b., I.c. and I.d. within 90 days of the receipt of this letter.

d. Submit the information requested in Part II. of this letter within 45 days of receipt of this letter.

Contact John Nagle of my staff (617) 918-1054 if you have questions regarding this request. The EPA looks forward to working with you on your new permit.

Sincerely,

Stephen S. Perkins, Director
Office of Ecosystem Protection

cc: Gerry Szal, MassDEP
David Webster, EPA
Julie Crocker, NMFS Protected Resources Division

Attachment I

Preliminary 316(b) Technology Feasibility Review

Mount Tom Station

The information included in this attachment, unless otherwise noted, was taken from the Mount Tom Station (MTS) Cooling Water Intake Structure (CWIS) Information Document, submitted to EPA on behalf of FirstLight Power Resources, LLC, in January of 2008 (MTS Report; 2008 Report). EPA is using the information included in the 2008 document to further the analysis and screening necessary to determine the best site-specific technology available to minimize the adverse environmental impacts from a CWIS at MTS. The inclusion of estimated performance and cost information from FirstLight in this attachment does not signify that EPA concurs with the information included in the 2008 report. In some cases, when no cost information was provided by MTS, EPA has inserted cost information to allow for comparison among technologies. EPA reserves the option to revise, amend or delete information included in this attachment as updated analyses and estimates are conducted.

1.0 Overview of Current MTS CWIS Characteristics

The intake structure at MTS consists of an 8.0 foot diameter pipe. The pipe opening at the river contains a series of parallel metal bars, with an 8.5 inch space between each bar. The bars are configured to prevent large objects from being pulled into the intake structure pipe. This structure extends approximately 30 feet into the river from shore, near the bottom, on an inside curve of Connecticut River mainstem.

From November through April, the permit limits the intake of water to one operating pump, with a flow limit of 68.4 MGD (47,500 gpm). This results in a “through screen” velocity at the bar screen of 2.1 fps.

From May through October, the permit limits the intake of water to two operating pumps, with a flow limit of 133.2 MGD (92,500 gpm). This results in a "through screen" velocity at the bar screen of 4.1 fps.

According to MTS Discharge Monitoring Reports from the year 2000 through 2004, the average water flow was 85.4 MGD.

An interior structure also makes up part of the CWIS. This interior structure is approximately 350 feet away from the river bank, with a "through screen" velocity of 1.6 fps at two 3/8 inch square traveling screen bays, each 10 feet wide by 13 feet deep.

The screen wash and return gutter system that removes debris from the screens also transports fish off the traveling screens. The screen wash pump water is taken from the facility discharge. Because the discharge water contains waste heat, this spray wash water has a temperature increase (delta T) of up to 32°F from ambient water in the river. The system washes off the traveling screens with 70 pounds per square inch (psi) water pressure. Fish are subjected to a large vertical free-fall from the end of the screen wash trough into a culvert, where a 300 foot half-pipe conveys the fish to the river. The half-pipe design of this part of the fish/debris return system exposes fish to adverse weather conditions. In addition, predators in the vicinity of the half-pipe are able to intercept fish during this last part of their transport back to the river.

An electric fish barrier has been in operation since facility start-up (1960) to reduce impingement. This barrier is located in front of the river intake of the CWIS. An MTS study conducted at EPA's request in 2007 concluded that "the electric barrier is not effective at deterring fish from entering the intake."

2.0 Impingement

An Impingement Study was conducted by Kleinschmidt on behalf of MTS from July 2006 through July 2008. A summary of the results is presented below:

- 85 fish impinged in first year
- 250 fish impinged in second year
- Based on continuous facility withdrawal

  572 fish estimated impinged in first year

  1,695 fish estimated impinged in second year

- Average yearly impingement estimate of 1,133 fish

Impingement was recorded in all months, with relatively high fish impingement numbers in December and March through April.

The species impinged included yellow perch, white sucker, spottail shiner, bluegill, gizzard shad, common shiner, Atlantic salmon. Impinged fish were predominantly, but not exclusively, resident species.

MTS estimated the overall impingement survival rate to be between 4 and 17%, depending on season. The study did not include the 300 foot transport to river in the evaluation.

3.0 Entrainment

A two year entrainment study was conducted from October 2008 through September 2010. MTS submitted the results of the study to EPA in November of 2010 (Mount Tom Generating Station Ichthyoplankton Data Report). According to MTS, a relatively small number of fish eggs were entrained in both years. Larvae were collected only in April through August of 2009 and May through July of 2010. Peak larval totals occurred in June. Common carp, herring and shiners made up the majority of the larvae collected. The volume of cooling water withdrawn during the spawning season was closely related to the number of larvae entrained. Based on monthly larval entrainment levels submitted by MTS, EPA estimated the number of larvae that would be entrained if the facility withdrew the maximum permitted rate in May, June and July. EPA estimated a value of approximately 6.8 million larvae in 2009 and approximately 16.6 million larvae in 2010, with an average of 11.7 million entrained larvae over the two years. In the absence of a site-specific study to investigate the potential survival of entrained ichthyoplankton at MTS, an entrainment mortality rate of 100% is assumed.

4.0 River / Withdrawal / Discharge Stats

Information presented in this section was calculated from MTS's NPDES permitted limits and the United States Geological Survey Connecticut River data. MTS withdraws approximately 1.4 % of the Connecticut River annual mean flow (9,264 MGD) and approximately 11.6% of the Connecticut River 7Q10 flow (1,147.2 MGD).

From November through April, the permit limits the intake of water to one operating pump, with a maximum flow limit of 68.4 MGD (47,500 gpm). The maximum discharge temperature limit for this time period is 102°F and the maximum delta T limit is 32°F

From May through October, the permit limits the intake of water to two operating pumps, with a maximum flow limit of 133.2 MGD (92,500 gpm). The maximum discharge temperature limit for this time period is 102°F and the maximum delta T limit is 20°F

As a way to assess the relative amount of water typically withdrawn by MTS, the following information was assembled, based on a five year average of the Connecticut River discharge:

CT River Discharge	time span	% of CT River withdrawn by MTS
30,000 cfs (19,389 MGD)	April, May	- 0.4 – 0.7% withdrawn by MTS
20,000 cfs (12,926 MGD)	Nov, Dec, Jan	- 0.5% withdrawn by MTS
15,000 cfs (9,695 MGD)	June	- 1.4% withdrawn by MTS
9,000 cfs (5,817 MGD)	Feb, March	- 1.2% withdrawn by MTS

7,000 cfs (4,524 MGD) October - 2.9% withdrawn by MTS

5,000 cfs (3,232 MGD) July, Aug - 4.1% withdrawn by MTS

3,000 cfs (1,939MGD) September - 6.9% withdrawn by MTS

5.0 Technology Evaluation

The following technologies have been evaluated by MTS to determine the degree to which they would be expected to minimize fish impingement and entrainment mortality at Mount Tom Station. MTS also provided the estimated site-specific cost of each technology, unless otherwise noted that EPA estimated the cost.

5.1 Mechanical Draft Cooling Towers (MDCT)

MDCT are expected to reduce the volume of non-contact cooling water needed by approximately 97%. The “through screen” velocity of the cooling water at the bar screen at the river would be reduced to approximately 0.11 fps. The reduction in cooling water would likely result in a corresponding percent decrease in fish impingement and entrainment mortality of approximately 97%. The thermal plume would also be reduced by a large percentage. The estimated percentage reduction was not included in the analysis.

The cost estimates for converting to MDCT at MTS are as follows:

- $58.4 million capital cost;
- $ 4.0 million lost generation during construction;
- $ 5.3 million annual operation and maintenance cost.

5.2 Natural Draft Cooling Towers (NDCT)

NDCTs are generally designed for facilities using non-contact cooling water at a rate of 200,000 gpm or greater. Since MTS uses less cooling water than this threshold (92,500 gpm), NDCTs are considered oversized in this site-specific case.

According to MTS, NDCTs of this size would increase O&M costs several times over MDCTs at their facility. In addition, MTS reports that the overall cost of NDCTs are expected to be higher than MDCTs, in this site-specific case. No cost estimates are included as part of the analysis. Based on the information that NDCTs are more costly than MDCTs and equally effective, EPA is not seeking this cost information as of the writing of this preliminary review.

5.3 Use of Grey Water

The Holyoke Water Pollution Control Facility (HWPCF) discharges up to 17 MGD and is 8.3 miles downstream of MTS. In theory, this facility could provide approximately 13% of the flow currently removed from the river by MTS from May through October and approximately 25% from November through April. EPA estimates that using water from the HWPCF could reduce the “through screen” velocity at the bar screen intake at the river intake point to 1.5 fps (November-April) and 3.5 fps (May – October).

While the MTS CWIS at the river would still have an approach velocity above 0.5 fps, EPA estimates that the use of grey water would likely reduce impingement by approximately 13% from May through October and approximately 25% from November through April. Also, EPA assumes that a likely reduction in entrainment of approximately 13% could be expected from May through October. The low entrainment rate projected from November through April would likely be unaffected.

One challenge facing this technology is the logistic difficulty related to the construction of a water transport pipe to connect the facilities. Also, the discharge of grey water at 102°F could increase the potential for additional primary productivity in the river in the vicinity of the MTS discharge.

No cost information is provided for the construction and operation of this technology. EPA is not seeking this cost information as of the writing of this preliminary review.

5.4 Year Round Flow Reduction

The objective of this option is to reduce the amount of cooling water used at MTS by remaining at one pump operation (68.4 MGD) all year. This would result in a 47 % reduction in flow during the May through October time period. It is projected to reduce impingement and entrainment by approximately 47%.

The "through screen" intake velocity at the metal bars at the river would remain approximately 2.1 fps. This velocity is well above 0.5 fps, which is considered by EPA to be a component of BTA in most cases. Assuming that the overall heat content of the thermal discharge does not change greatly from historical levels, the permitted delta T limit during the May through October time period would increase from 20°F to 32°F. Also, the maximum discharge temperature limit would increase from 102°F to 115°F for the months of May through October. The impact of the increased water temperature to the river (although with a reduced flow) during the warmer months has not been evaluated by the permittee.

According to the MTS 2008 Report, following the one pump operating conditions outlined above, plant output would be reduced by 21% during the months of June and September and approximately 37% during the months of July and August. This drop in production would cost the plant approximately $4 million per year in lost revenue.

5.5 May and June Flow Reduction

EPA has included this option for discussion. The objective of this option is similar to the option presented in Section 5.4, with the exception that one pump operation (68.4 MGD) is extended for the additional months of May and June only. According to the USGS Connecticut River 5 year flow average, July is expected to be a lower flow month, compared with May and June. EPA is concerned that increasing the delta T limit and maximum discharge temperature in July may have a larger impact on aquatic life in the river under expected lower flow conditions. As noted in Section 5.4, the impact of the increased water temperature to the river during July has not been evaluated by the permittee.

This modification may reduce entrainment by approximately 42%, as May and June are large entrainment months. Impingement, however, would only be reduced by approximately 1.6 - 5.7%

The lowest "through screen" intake velocity at the river would still be approximately 2.1 fps, well above 0.5 fps. The permitted delta T would increase to 32°F and the maximum discharge temperature would increase to 115°F for the months of May and June. The impact of the increased temperature to the river during these two additional months has not been evaluated by the permittee.

The estimated operational cost of this option is $2 million per year in lost revenue. NOTE: This cost is estimated by EPA and must be verified by MTS.

5.6 Variable Speed Pump

According to MTS, the installation and use of variable speed pumps to control the rate of cooling water used at the facility will reduce the approach velocity of the CWIS and thus reduce impingement. In order for this to be an effective operational measure, the facility must have excess pump capacity. The percentage of excess pump capacity at MTS for each month must be determined.

The estimated capital cost of this technology is $800,000. Yearly operational costs are not included.

5.7 Fish Return System Upgrade

There are many site-specific issues that must be taken into consideration when designing and operating a fish return system (FRS) that minimizes adverse impacts to fish. Some basic components of an FRS that satisfy BTA generally include 1) a travelling screen designed to minimize stress to impinged fish; 2) a low-pressure, ambient temperature spray wash system that dislodges fish from the traveling screen with a minimum of damage; 3) a sluiceway with no sharp angles or protrusions that may damage fish tissue; 4) a mechanism to reduce or eliminate predator access to the return system; and 5) a design that does not allow the fish to free-fall great distances into the shallow water at certain tides or river levels. In order to upgrade the current fish return system at MTS to satisfy BTA, the temperature of spray wash water must be ambient temperature. As discussed in Section 1.0 of this document, the screen wash pump water is taken from the facility discharge. Because the discharge water contains waste heat, this spray wash water has up to a 32°F delta T from ambient water in the river. Also, the sluiceway must be covered and modified to reduce predation and improve fish transport to the river. This will increase the potential for survival of fish that are impinged.

While this modification would not directly decrease fish impingement, it may reduce impingement mortality by 40%. This technology would provide no reduction in direct impingement and entrainment.

No cost information is provided for this upgrade. However, MTS includes the cost of the fish return upgrades in the Traveling Screen Upgrade, Section 5.8.

5.8 Traveling Screen Upgrade

In addition to the improved sluiceway described in Section 5.7, Ristroph traveling screens are also evaluated at the MTS CWIS. This technology provides no reduction in direct impingement and entrainment. However, along with upgrades to the fish return system detailed in Section 5.7, MTS estimates reductions in impingement mortality of approximately 40%.

MTS estimates the capital cost of this technology is $2 million. This cost includes the Ristroph traveling screens, additional spray water and a 500 foot long fish sluiceway. Operation and maintenance costs are estimated at $144,000.

5.9 Barrier Net

MTS evaluated a barrier net approximately 172 feet long and 20 feet deep, with a 3/8 inch mesh pore size (9.5 millimeter). A net of these dimensions and pore size would result in a through-net velocity of 0.06 fps. Installation of this technology involves construction and benthic disturbance in the Connecticut River in front of the CWIS.

MTS estimates a reduction in impingement of 100%, but at the pore size indicated, no reduction in entrainment is expected.

MTS estimates the capital cost to be $45,000 and the operation and maintenance cost to be $101,000 per year.

5.10 Electric Fish Barrier

Based on the information submitted by MTS as part of their December 2008 Impingement Report, the electric fish barrier is not effective at reducing impingement or entrainment. EPA is not seeking further information regarding this technology as of the writing of this preliminary review.

5.11 Cylindrical Wedge Wire Screens

This technology involves the installation of three cylindrical screens in the river in front of the MTS CWIS. Each screen would be 6 feet in diameter and 20 feet long. The screen openings would be 3 millimeters. Installation of this technology involves construction and benthic disturbance in the Connecticut River in front of the CWIS.

MTS estimates that the wedge wire screens as described here will reduce impingement by 100%. The permittee did not specify the reduction in entrainment of Connecticut River ichthyoplankton by using wedge wire screens with a mesh size of 3 millimeters or the associated mortality of ichthyoplankton encountering the wedge wire screen, but EPA assumes this mesh size to be largely ineffective in reducing entrainment in this case.

There is the potential for river debris to clog the surface of the wedge wire screen cylinders. This may increase operation and maintenance costs.

The costs associated with the 3 millimeter wedge wire screen cylinders are estimated by MTS as follows:

- $ 7 million capital cost
- $ 2 million lost generation during construction
- $ 32,000 operation and maintenance cost per year

5.12 Expanded Intake At River

This technology is based on increasing the overall opening of the CWIS at the river. Provided the same volume of water is being withdrawn, a larger opening will result in a reduced “through-screen” velocity at the river. The opening will be sized to result in a through-screen velocity of 0.5 fps.

No barrier is included to prevent fish from entering the large intake openings in the river. Without a physical barrier, this technology will still allow fish to enter into the intake pipe and become impinged on the rotating screens at the end of the pipe. Ristroph screens and an improved fish return system (see Sections 5.7 and 5.8) are included as part of this technology to reduce impingement mortality when this occurs. Installation of this technology involves construction and benthic disturbance in the Connecticut River in front of the CWIS.

MTS estimates that this technology will reduce impingement by 80% and reduce impingement mortality by 40%.

This technology will have no measurable impact on losses due to ichthyoplankton entrainment.

A capital cost of $6 million is estimated by MTS to expand the intake at the station.

An additional $6 million in lost generation during construction is projected. No operation and maintenance costs are included.

5.13 CWIS Relocation

Kynard et al (2003) predicted that greater numbers of fish will likely be impinged if the CWIS at MTS is moved further away from the river bank and closer to the channel.

The MTS CWIS is currently located at a bend in the river, far from the main channel.

Relocation of the CWIS, while maintaining the present design, capacity and construction features, is not considered an effective technology to reduce impingement or entrainment.

EPA is not seeking additional information regarding CWIS relocation as of the writing of this preliminary review.

6.0 Technology Analysis and Comparison

Based on the preliminary information presented in Section 5 of this document, natural draft cooling towers, the use of grey water, variable speed pumps, electric fish barrier, and CWIS relocation have been set aside and are not included for further BTA analysis as of the writing of this review.

The remaining technologies are compared in the tables and graphs below.

EPA has estimated the annual cost based on capital costs and operational and maintenance costs provided by MTS in the Cooling Water Intake Structure Information Document (January 2008), unless otherwise noted. EPA estimated the life of the various technologies and assumed the discount rate. These costs, estimates and assumptions must be verified by MTS.

Mount Tom Station Impingement Technologies

	additional cost per year	yearly fish impingement mortality	impingement mortality reduction	additional # of fish survive per year	# of fish die per year
Current Operation/Technology	$0	1,133	0.0%	0	1,133
Mechanical Draft Cooling Towers	$4,146,351	------	97.0%	1,099	34
Year Round Flow Reduction	$1,559,510	------	47.0%	533	600
May and June Flow Reduction	$779,755	------	5.7%	65	1,068
Fish Return System Upgrade	$122,809	------	40.0%	453	680
Barrier Net	$76,285	------	100.0%	1,133	0
Wedgewire Screen Cylinders	$466,188	------	100.0%	1,133	0
Expanded River CWIS	$400,000	------	90.0%	1,020	113

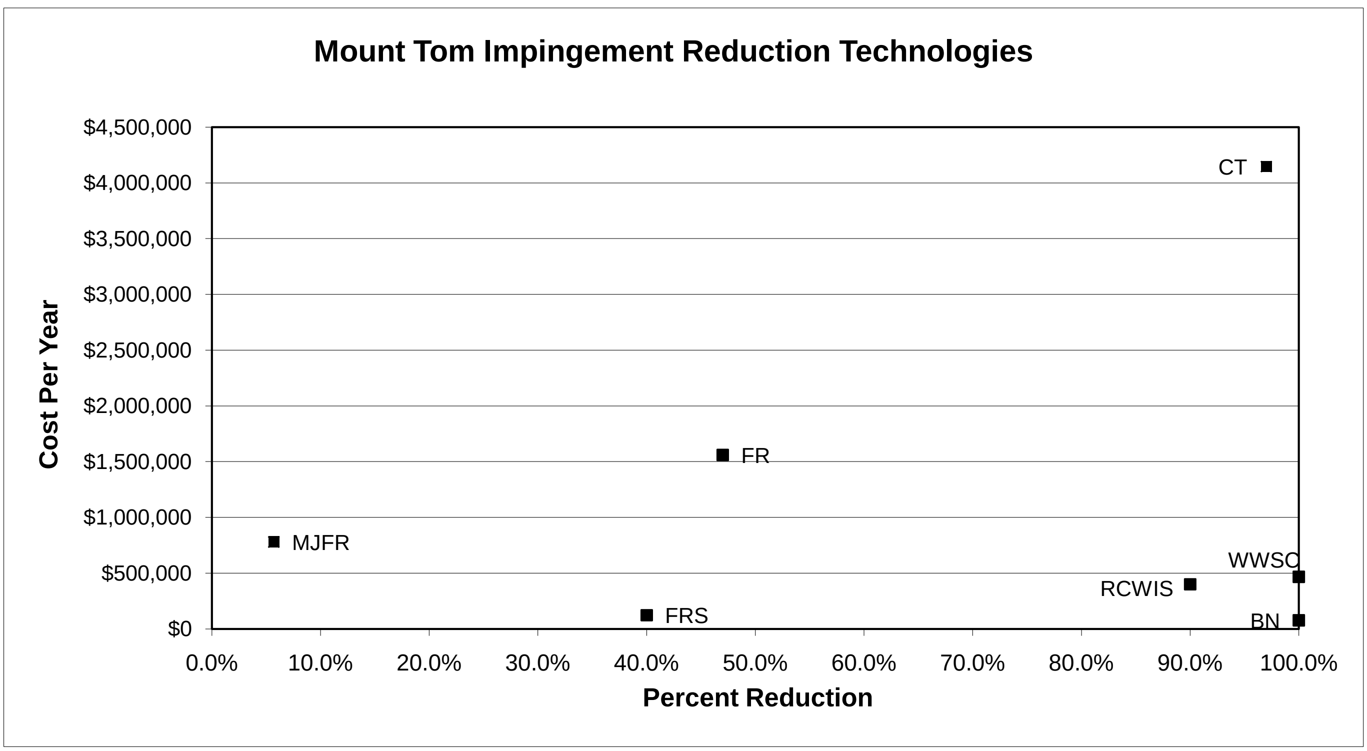
Mount Tom Station Entrainment Technologies

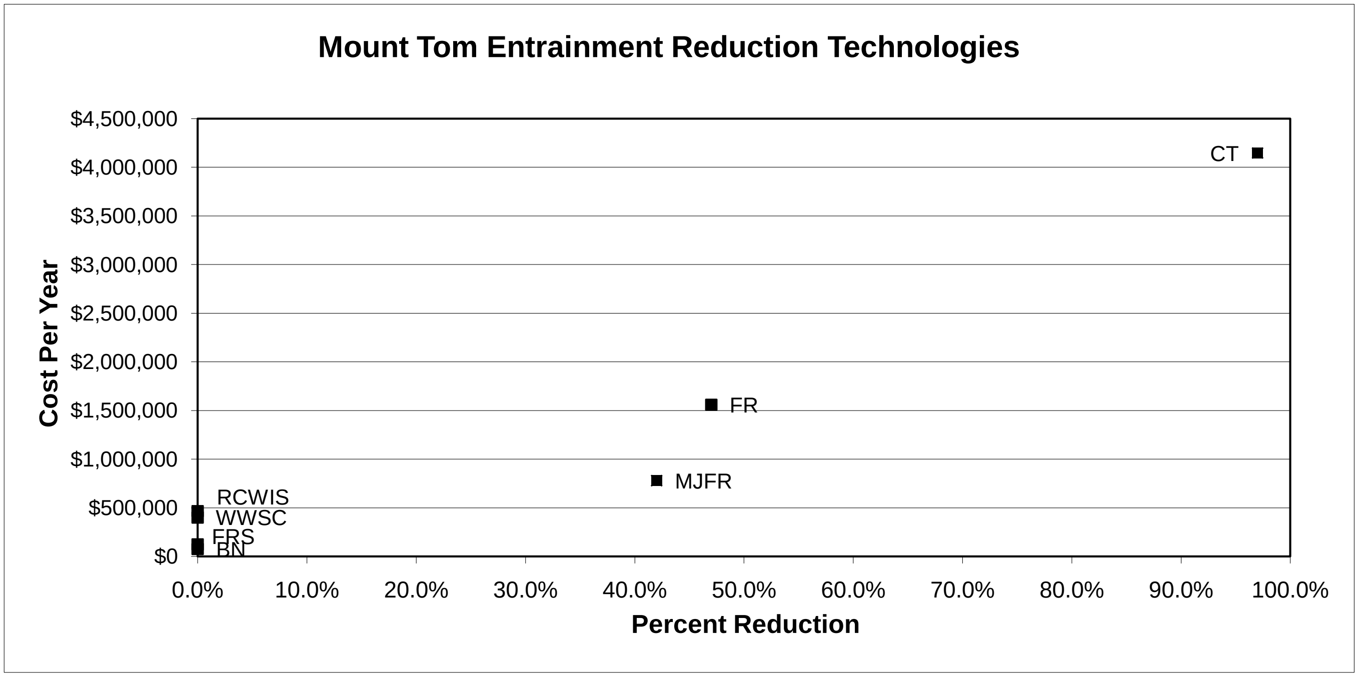
	cost per year	yearly larval entrainment	entrainment reduction	larval survival per year	larval mortality per year
Current Operation/Technology	$0	11,693,000	0.0%	0	11,693,000
Mechanical Draft Cooling Towers	$4,146,351	-----------	97.0%	11,342,210	350,790
Year Round Flow Reduction	$1,559,510	-----------	47.0%	5,495,710	6,197,290
May and June Flow Reduction	$779,755	-----------	42.0%	4,911,060	6,781,940
Fish Return System Upgrade	$122,809	-----------	0.0%	0	11,693,000
Barrier Net	$76,285	-----------	0.0%	0	11,693,000
Wedgewire Screen Cylinders	$466,188	-----------	0.0%	0	11,693,000
Expanded River CWIS	$400,000	-----------	0.0%	0	11,693,000

Costs include capital and operation/maintenance costs annualized over 30-year life of the cooling towers, flow reduction, and expanded river intake structure. Assumes a discount rate of *7.6%* pre-tax nominal value.

Costs include capital and operation/maintenance costs annualized over 20-year life of the cylindrical wedgewire screen intakes. Assumes a discount rate of *7.6%* pre-tax nominal value.

Costs include capital and operation/maintenance costs annualized over a 9 year life of the barrier nets (net and two spares). Assumes a discount rate of *7.6%* pre-tax nominal value.





CT	Mechanical Draft Cooling Towers
FR	Year round flow reduction
MJFR	May and June flow reduction
FRS	Fish return system upgrade
BN	Barrier Net
WWSC	Wedgewire screen cylinders
RCWIS	Expanded River CWIS